

*If you are using a printed copy of this procedure, and not the on-screen version, then you **MUST** make sure the dates at the bottom of the printed copy and the on-screen version match. The on-screen version of the Collider-Accelerator Department Procedure is the Official Version. Hard copies of all signed, official, C-A Operating Procedures are kept on file in the C-A ESHQ Training Office, Bldg. 911A.*

## C-A OPERATIONS PROCEDURES MANUAL

### ATTACHMENT

#### 4.120.62.a Booster Critical Device Tests

C-A-OPM Procedures in which this Attachment is used.		
4.120.62		

#### Hand Processed Changes

<u>HPC No.</u>	<u>Date</u>	<u>Page Nos.</u>	<u>Initials</u>
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

Approved: \_\_\_\_\_ *Signature on File* \_\_\_\_\_  
 Collider-Accelerator Department Chairman Date

V. Castillo

#### 4.120.62.a Booster Critical Device Tests

### PASS ANNUAL ACCEPTANCE TEST PROTOCOL

Division A Software Filename and Checksum: Title: \_\_\_\_\_ Checksum: \_\_\_\_\_

Division B Software Filename and Checksum: Title: \_\_\_\_\_ Checksum: \_\_\_\_\_

**Initial testing complete:**

Test Team Leader's Name (Print): \_\_\_\_\_ Life Number: \_\_\_\_\_

Test Team Leader's Name (Sign): \_\_\_\_\_ Date: \_\_\_\_/\_\_\_\_/\_\_\_\_

**Acceptance test procedure complete (following repairs and retesting if required):**

Test Team Leader's Name (Print): \_\_\_\_\_ Life Number: \_\_\_\_\_

Test Team Leader's Name (Sign): \_\_\_\_\_ Date: \_\_\_\_/\_\_\_\_/\_\_\_\_

**Test results reviewed by:**

Safety Section Head's Name (Print): \_\_\_\_\_ Life Number: \_\_\_\_\_

Safety Section Head's Name (Sign): \_\_\_\_\_ Date: \_\_\_\_/\_\_\_\_/\_\_\_\_

**Test results accepted by Radiation Safety Committee:**

RSC Member's Name (Print): \_\_\_\_\_ Life Number: \_\_\_\_\_

RSC Member's Name (Sign): \_\_\_\_\_ Date: \_\_\_\_/\_\_\_\_/\_\_\_\_

## 1.1 Setup and test of Booster Critical Devices: DH2, 3 and F6 septum Power Supplies

- |                          |  |  |                 |
|--------------------------|--|--|-----------------|
| <input type="checkbox"/> | <b>VERIFY</b>  | <b>Power Supply DH2, 3 is</b>  | <b>LOTO</b>     |
| <input type="checkbox"/> | <b>VERIFY</b>  | <b>Power Supply F6 is</b>  | <b>LOTO</b>     |
| <input type="checkbox"/> | <b>VERIFY</b>  | At panel <b>H</b> in MCR <b>DH2, 3 ready light</b> is  | <b>OFF</b>      |
| <input type="checkbox"/> | <b>VERIFY</b>  | At panel <b>H</b> in MCR <b>F6 ready light</b> is  | <b>OFF</b>      |
| <input type="checkbox"/> | <b>PLACE</b>   | <b>Bstr</b> in Controlled access ( <b>CA</b> )   |                 |
| <input type="checkbox"/> | <b>VERIFY</b>  | MCR sees at Opto Monitor <b>Bstr</b> in  | <b>CA</b>       |
| <input type="checkbox"/> | <b>CAPTURE</b>   | <b>Booster Key Lock-Out</b> on MCR panel <b>H</b>  |                 |
| <input type="checkbox"/> | <b>VERIFY</b>  | MCR sees at Opto Monitor <b>Booster key Lock-Out</b> is  | <b>CAPTURED</b> |
| <input type="checkbox"/> | <b>TURN ON</b>   | At encl 4521 relays: <b>HK4</b> and <b>HK5</b>   |                 |
| <input type="checkbox"/> | <b>VERIFY</b>  | At encl 4521 relays: <b>HK4</b> <input type="checkbox"/> and <b>HK5</b> <input type="checkbox"/> are | <b>ON</b>       |
|                          | <b>ENABLE</b>  | <b>Extraction</b> with <b>693</b> key at panel <b>H</b> in MCR                                       |                 |
| <input type="checkbox"/> | <b>VERIFY</b>  | At panel <b>H</b> in MCR <b>DH2, 3 ready light</b> is  | <b>ON</b>       |
| <input type="checkbox"/> | <b>VERIFY</b>  | At panel <b>H</b> in MCR <b>F6 ready light</b> is  | <b>ON</b>       |
| <input type="checkbox"/> | <b>TURN OFF</b>  | At encl 4521 relay <b>HK4</b>  |                 |
| <input type="checkbox"/> | <b>VERIFY</b>  | At encl 4521 relay <b>HK4</b> is   | <b>OFF</b>      |
| <input type="checkbox"/> | <b>VERIFY</b>  | At panel <b>H</b> in MCR <b>DH2, 3 ready light</b> is  | <b>OFF</b>      |
| <input type="checkbox"/> | <b>VERIFY</b>  | At panel <b>H</b> in MCR <b>F6 ready light</b> is  | <b>OFF</b>      |
| <input type="checkbox"/> | <b>TURN ON</b>   | At encl 4521 relays: <b>HK4</b> and <b>HK5</b>   |                 |
| <input type="checkbox"/> | <b>VERIFY</b>  | At encl 4521 relays: <b>HK4</b> <input type="checkbox"/> and <b>HK5</b> <input type="checkbox"/> are | <b>ON</b>       |
| <input type="checkbox"/> | <b>VERIFY</b>  | At panel <b>H</b> in MCR <b>DH2, 3 ready light</b> is  | <b>ON</b>       |
| <input type="checkbox"/> | <b>VERIFY</b>  | At panel <b>H</b> in MCR <b>F6 ready light</b> is  | <b>ON</b>       |
|                          | <b>PRESS</b>   | <b>Extraction Disable</b> Switch at panel <b>H</b> in MCR  |                 |
| <input type="checkbox"/> | <b>VERIFY</b>  | At panel <b>H</b> in MCR <b>DH2, 3 ready light</b> is  | <b>OFF</b>      |
| <input type="checkbox"/> | <b>VERIFY</b>  | At panel <b>H</b> in MCR <b>F6 ready light</b> is  | <b>OFF</b>      |
| <input type="checkbox"/> | <b>TURN OFF</b>  | At encl 4521 relays: <b>HK4</b> and <b>HK5</b>   |                 |
| <input type="checkbox"/> | <b>VERIFY</b>  | At encl 4521 relays: <b>HK4</b> <input type="checkbox"/> and <b>HK5</b> <input type="checkbox"/> are | <b>OFF</b>      |
| <input type="checkbox"/> | <b>Check for acceptance of Setup and test of Booster Critical Devices: DH2, 3 and F6 septum Power Supplies</b> |  |                 |

**1.2 Setup and test of Booster Critical Devices: LTB Beam-Stop1(Ltb 1) and LTB Beam-Stop 2 (Ltb 2)**

<input type="checkbox"/>	<b>PLACE</b>	Booster ( <b>Bstr</b> ) in Restricted Access ( <b>RA</b> )	
<input type="checkbox"/>	<b>VERIFY</b>	<b>MCR</b> sees at Opto Monitor <b>Bstr</b> in	<b>RA</b>
<input type="checkbox"/>	<b>VERIFY</b>	At <b>MCR</b> panel GH <b>Ltb1</b> Command ( <b>Cmd</b> ) is	<b>CLOSED</b>
<input type="checkbox"/>	<b>VERIFY</b>	At <b>MCR</b> panel GH <b>Ltb1</b> Command ( <b>Cmd</b> ) is	<b>CLOSED</b>
<input type="checkbox"/>	<b>PLACE</b>	<b>Bstr</b> in Controlled Access ( <b>CA</b> )	
<input type="checkbox"/>	<b>VERIFY</b>	<b>MCR</b> sees at Opto Monitor <b>Bstr</b> in	<b>CA</b>
<input type="checkbox"/>	<b>RESET</b>	<b>Bstr gates:</b> Laby-A, Laby-B, Emer Door, Man Lock, Plug Door, Booster Berm	
<input type="checkbox"/>	<b>VERIFY</b>	<b>MCR</b> sees at Opto Monitor <b>Bstr gates:</b> Laby-A <input type="checkbox"/> , Laby-B <input type="checkbox"/> , Emer Door <input type="checkbox"/> , Man Lock <input type="checkbox"/> , Plug Door <input type="checkbox"/> , Booster Berm <input type="checkbox"/>	<b>RESET</b>
<input type="checkbox"/>	<b>SWEEP</b>	<b>Bstr</b>	
<input type="checkbox"/>	<b>VERIFY</b>	<b>MCR</b> sees at Opto Monitor <b>Bstr</b>	<b>SWEEP COMPL</b>
<input type="checkbox"/>	<b>VERIFY</b>	<b>MCR</b> sees at Opto Monitor <b>Bstr Crash</b> <input type="checkbox"/> and <b>Rdn Crash</b> <input type="checkbox"/>	<b>OK</b>
<input type="checkbox"/>	<b>VERIFY</b>	<b>MCR</b> sees at Opto Monitor <b>Bstr Area Lights</b>	<b>DIMMED</b>
<input type="checkbox"/>	<b>TURN ON</b>	At encl 4521 <b>relays: HK4</b> and <b>HK5</b>	
<input type="checkbox"/>	<b>VERIFY</b>	At encl 4521 <b>AGS Inlks OK</b> Primary relay <b>HK4</b> is	<b>ON</b>
<input type="checkbox"/>	<b>VERIFY</b>	At encl 4521 <b>AGS Inlks OK</b> Redundant relay <b>HK5</b> is	<b>ON</b>
<input type="checkbox"/>	<b>VERIFY</b>	<b>MCR</b> sees at Opto Monitor <b>Bstr Cmks:</b> <b>NMO 058</b> <input type="checkbox"/> , <b>NMO 059</b> <input type="checkbox"/> and <b>NMO 060</b> <input type="checkbox"/>	<b>OK</b>
<input type="checkbox"/>	<b>VERIFY</b>	<b>MCR</b> sees at Opto Monitor <b>8° / 20° / H-L valve / B15 Xfmr</b>	<b>OK</b>
<input type="checkbox"/>	<b>VERIFY</b>	<b>MCR</b> sees at Opto Monitor <b>Water</b> for: <b>D3</b> <input type="checkbox"/> and <b>B6</b> <input type="checkbox"/>	<b>OK</b>
<input type="checkbox"/>	<b>VERIFY</b>	<b>MCR</b> sees at Opto Monitor <b>NSRL Ilks:</b> <b>Div A</b> <input type="checkbox"/> and <b>Div B</b> <input type="checkbox"/>	<b>OK</b>
<input type="checkbox"/>	<b>VERIFY</b>	<b>MCR</b> sees at Opto Monitor <b>PASS Rhbk:</b> <b>Pri</b> <input type="checkbox"/> and <b>Rdn</b> <input type="checkbox"/>	<b>OK</b>
<input type="checkbox"/>	<b>CLOSE</b>	At encl 4521 bldg 914 <b>LTB Lock-Out switch</b>	
<input type="checkbox"/>	<b>VERIFY</b>	<b>MCR</b> sees at Opto Monitor <b>LTB Lock-Out switch</b>	<b>CLOSED</b>
<input type="checkbox"/>	<b>HAVE</b>	<b>MCR Operator</b> Open <b>Ltb 1</b> and <b>Ltb 2</b>	
<input type="checkbox"/>	<b>VERIFY</b>	<b>MCR</b> sees at Opto Monitor <b>Ltb 1</b> <input type="checkbox"/> and <b>Ltb 2</b> <input type="checkbox"/>	<b>OPEN</b>
<input type="checkbox"/>	<b>TRIP</b>	<b>Chipmunk NMO</b> _____	
<input type="checkbox"/>	<b>VERIFY</b>	<b>MCR</b> sees at Opto Monitor <b>NMO</b> _____	<b>INTLK</b>
<input type="checkbox"/>	<b>VERIFY</b>	<b>MCR</b> sees at Opto Monitor <b>Ltb 1</b> <input type="checkbox"/> and <b>Ltb 2</b> <input type="checkbox"/>	<b>CLOSED</b>
<input type="checkbox"/>	<b>HAVE</b>	<b>MCR Operator</b> Open <b>Ltb 1</b> and <b>Ltb 2</b>	
<input type="checkbox"/>	<b>VERIFY</b>	<b>Attempt to Open</b> <b>Ltb 1</b> <input type="checkbox"/> and <b>Ltb 2</b> <input type="checkbox"/>	<b>FAIL</b>

	<b>RESET</b>	Chipmunk NMO _____	
<input type="checkbox"/>	<b>VERIFY</b>	MCR sees at Opto Monitor Chipmunk NMO _____	<b>RESET</b>
	<b>HAVE</b>	MCR Operator Open <b>Ltb 1</b> and <b>Ltb 2</b>	
<input type="checkbox"/>	<b>VERIFY</b>	Attempt to Open <b>Ltb 1</b> <input type="checkbox"/> and <b>Ltb 2</b> <input type="checkbox"/>	<b>SUCCESSFUL</b>

- ☐ **Check for acceptance of Setup and test of Booster Critical Devices: LTB Beam-Stop1(Ltb 1) and LTB Beam-Stop 2 (Ltb 2)**

### 1.3 Setup and test of Booster Critical Devices: TTB Beam-Stop1(Ttb 1) and TTB Beam-Stop 2 (Ttb 2)

	<b>PLACE</b>	Booster ( <b>Bstr</b> ) in Restricted Access ( <b>RA</b> )	
<input type="checkbox"/>	<b>VERIFY</b>	MCR sees at Opto Monitor <b>Bstr</b> in	<b>RA</b>
<input type="checkbox"/>	<b>VERIFY</b>	At MCR panel GH <b>Ltb1</b> Command ( <b>Cmd</b> ) is	<b>CLOSED</b>
<input type="checkbox"/>	<b>VERIFY</b>	At MCR panel GH <b>Ltb1</b> Command ( <b>Cmd</b> ) is	<b>CLOSED</b>
	<b>PLACE</b>	<b>Bstr</b> in Controlled Access ( <b>CA</b> )	
<input type="checkbox"/>	<b>VERIFY</b>	MCR sees at Opto Monitor <b>Bstr</b> in	<b>CA</b>
	<b>RESET</b>	<b>Bstr gates:</b> Laby-A, Laby-B, Emer Door, Man Lock, Plug Door, Booster Berm	
<input type="checkbox"/>	<b>VERIFY</b>	MCR sees at Opto Monitor <b>Bstr gates:</b> Laby-A <input type="checkbox"/> , Laby-B <input type="checkbox"/> , Emer Door <input type="checkbox"/> , Man Lock <input type="checkbox"/> , Plug Door <input type="checkbox"/> , Booster Berm <input type="checkbox"/>	<b>RESET</b>
	<b>SWEEP</b>	<b>Bstr</b>	
<input type="checkbox"/>	<b>VERIFY</b>	MCR sees at Opto Monitor <b>Bstr</b>	<b>SWEEP COMPL</b>
<input type="checkbox"/>	<b>VERIFY</b>	MCR sees at Opto Monitor <b>Bstr Crash</b> <input type="checkbox"/> and <b>Rdn Crash</b> <input type="checkbox"/>	<b>OK</b>
<input type="checkbox"/>	<b>VERIFY</b>	MCR sees at Opto Monitor <b>Bstr Area Lights</b>	<b>DIMMED</b>
	<b>TURN ON</b>	At encl 4521 <b>relays: HK4</b> and <b>HK5</b>	
<input type="checkbox"/>	<b>VERIFY</b>	At encl 4521 <b>AGS Inlks OK</b> Primary relay <b>HK4</b> is	<b>ON</b>
<input type="checkbox"/>	<b>VERIFY</b>	At encl 4521 <b>AGS Inlks OK</b> Redundant relay <b>HK5</b> is	<b>ON</b>
<input type="checkbox"/>	<b>VERIFY</b>	MCR sees at Opto Monitor <b>Bstr Cmks:</b> NMO 058 <input type="checkbox"/> , NMO 059 <input type="checkbox"/> and NMO 060 <input type="checkbox"/>	<b>OK</b>
<input type="checkbox"/>	<b>VERIFY</b>	MCR sees at Opto Monitor <b>8° / 20° / H-L valve / B15 Xfmr</b>	<b>OK</b>
<input type="checkbox"/>	<b>VERIFY</b>	MCR sees at Opto Monitor <b>Water</b> for: <b>D3</b> <input type="checkbox"/> and <b>B6</b> <input type="checkbox"/>	
<input type="checkbox"/>	<b>VERIFY</b>	MCR sees at Opto Monitor <b>NSRL Ilks:</b> Div A <input type="checkbox"/> and Div B <input type="checkbox"/>	<b>OK</b>
<input type="checkbox"/>	<b>VERIFY</b>	MCR sees at Opto Monitor <b>PASS Rhbk:</b> Pri <input type="checkbox"/> and Rdn <input type="checkbox"/>	<b>OK</b>
	<b>CLOSE</b>	At encl 4521 bldg 914 <b>TTB Lock-Out switch</b>	
<input type="checkbox"/>	<b>VERIFY</b>	MCR sees at Opto Monitor <b>LTB Lock-Out switch</b>	<b>CLOSED</b>

<input type="checkbox"/>	<b>HAVE VERIFY</b>	MCR Operator Open <b>Ttb 1</b> and <b>Ttb 2</b> MCR sees at Opto Monitor <b>Ttb 1</b> <input type="checkbox"/> and <b>Ttb 2</b> <input type="checkbox"/>	<b>OPEN</b>
<input type="checkbox"/>	<b>TRIP VERIFY</b>	<b>Chipmunk NMO</b> _____ MCR sees at Opto Monitor <b>NMO</b> _____	<b>INTLK</b>
<input type="checkbox"/>	<b>VERIFY</b>	MCR sees at Opto Monitor <b>Ttb 1</b> <input type="checkbox"/> and <b>Ttb 2</b> <input type="checkbox"/>	<b>CLOSED</b>
<input type="checkbox"/>	<b>HAVE VERIFY</b>	MCR Operator Open <b>Ttb 1</b> and <b>Ttb 2</b> <b>Attempt to Open Ttb 1</b> <input type="checkbox"/> and <b>Ttb 2</b> <input type="checkbox"/>	<b>FAIL</b>
<input type="checkbox"/>	<b>RESET VERIFY</b>	<b>Chipmunk NMO</b> _____ MCR sees at Opto Monitor <b>Chipmunk NMO</b> _____	<b>RESET</b>
<input type="checkbox"/>	<b>HAVE VERIFY</b>	MCR Operator Open <b>Ttb 1</b> and <b>Ttb 2</b> <b>Attempt to Open Ttb 1</b> <input type="checkbox"/> and <b>Ttb 2</b> <input type="checkbox"/>	<b>SUCCESSFUL</b>
<input type="checkbox"/>	<b>Check for acceptance of Setup and test of Booster Critical Devices: TTB Beam-Stop1(Ttb 1) and TTB Beam-Stop 2 (Ttb 2)</b>		

#### 1.4 Setup and test of Booster Critical Device DH2, 3 Power Supply under power

<input type="checkbox"/>	<b>PLACE VERIFY</b>	<b>Feed forward (FF) switch in OFF position</b> FF switch is in	<b>OFF Posn</b>
<input type="checkbox"/>	<b>VERIFY</b>	<b>Power Supply DH2, 3 is</b>	<b>NO LOTO</b>
<input type="checkbox"/>	<b>VERIFY</b>	<b>Power Supply F6 is</b>	<b>NO LOTO</b>
<input type="checkbox"/>	<b>VERIFY</b>	At panel <b>H</b> in MCR <b>DH2, 3 ready light</b> is	<b>OFF</b>
<input type="checkbox"/>	<b>VERIFY</b>	At panel <b>H</b> in MCR <b>F6 ready light</b> is	<b>OFF</b>
<input type="checkbox"/>	<b>PLACE VERIFY</b>	<b>Bstr</b> in Controlled access (CA) MCR sees at Opto Monitor <b>Bstr</b> in	<b>CA</b>
<input type="checkbox"/>	<b>CAPTURE VERIFY</b>	<b>Booster Key Lock-Out</b> on MCR panel <b>H</b> MCR sees at Opto Monitor <b>Booster key Lock-Out</b> is	<b>CAPTURED</b>
<input type="checkbox"/>	<b>TURN ON VERIFY</b>	At encl 4521 <b>relays: HK4</b> and <b>HK5</b> At encl 4521 <b>AGS Inlks OK</b> Primary relay <b>HK4</b> is	<b>ON</b>
<input type="checkbox"/>	<b>VERIFY</b>	At encl 4521 <b>AGS Inlks OK</b> Redundant relay <b>HK5</b> is	<b>ON</b>
<input type="checkbox"/>	<b>ENABLE</b>	<b>Extraction</b> with <b>693</b> key at panel <b>H</b> in MCR	
<input type="checkbox"/>	<b>VERIFY</b>	At panel <b>H</b> in MCR <b>DH2, 3 ready light</b> is	<b>ON</b>
<input type="checkbox"/>	<b>VERIFY</b>	At panel <b>H</b> in MCR <b>F6 ready light</b> is	<b>ON</b>
<input type="checkbox"/>	<b>HAVE VERIFY</b>	MCR Operator <b>turn on DH2, 3</b> Power supply <b>DH2, 3</b> Power Supply is	<b>ON</b>
<input type="checkbox"/>	<b>OPEN VERIFY</b>	At encl 4521 relay <b>HK4</b> MCR sees at Opto Monitor <b>AGS Inlks OK</b> Primary	<b>INTLK</b>

<input type="checkbox"/>	<b>VERIFY</b>	<b>MCR</b> sees <b>DH2, 3</b> Power Supply	<b>OFF</b>
<input type="checkbox"/>	<b>VERIFY</b>	At panel <b>H</b> in MCR <b>DH2, 3</b> ready light is	<b>OFF</b>
<input type="checkbox"/>	<b>VERIFY</b>	At panel <b>H</b> in MCR <b>F6</b> ready light is	<b>OFF</b>
<input type="checkbox"/>	<b>VERIFY</b>	At encl 4521 relays <b>HK4</b> is	<b>OFF</b>
<input type="checkbox"/>	<b>VERIFY</b>	Attempt to turn on <b>DH2, 3</b>	<b>FAIL</b>
	<b>TURN ON</b>	At encl 4521 relays: <b>HK4</b> and <b>HK5</b>	
<input type="checkbox"/>	<b>VERIFY</b>	At encl 4521 <b>AGS Inlks OK</b> Primary relay <b>HK4</b> is	<b>ON</b>
<input type="checkbox"/>	<b>VERIFY</b>	At encl 4521 <b>AGS Inlks OK</b> Redundant relay <b>HK5</b> is	<b>ON</b>
	<b>ENABLE</b>	<b>Extraction</b> with <b>693</b> key at panel <b>H</b> in MCR	
<input type="checkbox"/>	<b>VERIFY</b>	At panel <b>H</b> in MCR <b>DH2, 3</b> ready light is	<b>ON</b>
<input type="checkbox"/>	<b>VERIFY</b>	At panel <b>H</b> in MCR <b>F6</b> ready light is	<b>ON</b>
	<b>PRESS</b>	<b>Extraction Disable</b> Switch at panel <b>H</b> in MCR	
<input type="checkbox"/>	<b>VERIFY</b>	At panel <b>H</b> in MCR <b>DH2, 3</b> ready light is	<b>OFF</b>
<input type="checkbox"/>	<b>VERIFY</b>	At panel <b>H</b> in MCR <b>F6</b> ready light is	<b>OFF</b>
	<b>TURN OFF</b>	At encl 4521 relays: <b>HK4</b> and <b>HK5</b>	
<input type="checkbox"/>	<b>VERIFY</b>	At encl 4521 relays: <b>HK4</b> <input type="checkbox"/> and <b>HK5</b> <input type="checkbox"/> are	<b>OFF</b>
<input type="checkbox"/>	<b>Check for acceptance of Setup and test of Booster Critical Device DH2, 3 Power Supply under power</b>		

#### 1.5 Setup and test of Booster Critical Device F6 Power Supply under power

<input type="checkbox"/>	<b>PLACE</b>	<b>Feed forward (FF)</b> switch in <b>OFF</b> position	
<input type="checkbox"/>	<b>VERIFY</b>	<b>FF</b> switch is in	<b>OFF Posn</b>
<input type="checkbox"/>	<b>VERIFY</b>	<b>Power Supply DH2, 3</b> is	<b>NO LOTO</b>
<input type="checkbox"/>	<b>VERIFY</b>	<b>Power Supply F6</b> is	<b>NO LOTO</b>
<input type="checkbox"/>	<b>VERIFY</b>	At panel <b>H</b> in MCR <b>DH2, 3</b> ready light is	<b>OFF</b>
<input type="checkbox"/>	<b>VERIFY</b>	At panel <b>H</b> in MCR <b>F6</b> ready light is	<b>OFF</b>
	<b>PLACE</b>	<b>Bstr</b> in Controlled access ( <b>CA</b> )	
<input type="checkbox"/>	<b>VERIFY</b>	<b>MCR</b> sees at Opto Monitor <b>Bstr</b> in	<b>CA</b>
	<b>CAPTURE</b>	<b>Booster Key Lock-Out</b> on MCR panel <b>H</b>	
<input type="checkbox"/>	<b>VERIFY</b>	<b>MCR</b> sees at Opto Monitor <b>Booster key Lock-Out</b> is	<b>CAPTURED</b>
	<b>TURN ON</b>	At encl 4521 relays: <b>HK4</b> and <b>HK5</b>	
<input type="checkbox"/>	<b>VERIFY</b>	At encl 4521 <b>AGS Inlks OK</b> Primary relay <b>HK4</b> is	<b>ON</b>
<input type="checkbox"/>	<b>VERIFY</b>	At encl 4521 <b>AGS Inlks OK</b> Redundant relay <b>HK5</b> is	<b>ON</b>
	<b>ENABLE</b>	<b>Extraction</b> with <b>693</b> key at panel <b>H</b> in MCR	
<input type="checkbox"/>	<b>VERIFY</b>	At panel <b>H</b> in MCR <b>DH2, 3</b> ready light is	<b>ON</b>
<input type="checkbox"/>	<b>VERIFY</b>	At panel <b>H</b> in MCR <b>F6</b> ready light is	<b>ON</b>

- |                          |  |  |              |
|--------------------------|--|--|--------------|
| <input type="checkbox"/> | <b>HAVE<br/>VERIFY</b>   | MCR Operator <b>turn on F6</b> Power supply<br><b>DH2, 3</b> Power Supply is   | <b>ON</b>    |
| <input type="checkbox"/> | <b>OPEN<br/>VERIFY</b>   | At encl 4521 relay <b>HK5</b><br>MCR sees at Opto Monitor <b>AGS Inlks OK</b> Redundant  | <b>INTLK</b> |
| <input type="checkbox"/> | <b>VERIFY</b>  | MCR sees <b>DH2, 3</b> Power Supply  | <b>OFF</b>   |
| <input type="checkbox"/> | <b>VERIFY</b>  | At panel <b>H</b> in MCR <b>DH2, 3 ready light</b> is  | <b>OFF</b>   |
| <input type="checkbox"/> | <b>VERIFY</b>  | At panel <b>H</b> in MCR <b>F6 ready light</b> is  | <b>OFF</b>   |
| <input type="checkbox"/> | <b>VERIFY</b>  | At encl 4521 relays <b>HK5</b> is  | <b>OFF</b>   |
| <input type="checkbox"/> | <b>VERIFY</b>  | Attempt to turn on <b>DH2, 3</b>   | <b>FAIL</b>  |
| <input type="checkbox"/> | <b>TURN ON<br/>VERIFY</b>  | At encl 4521 <b>relays: HK4 and HK5</b><br>At encl 4521 <b>AGS Inlks OK</b> Primary relay <b>HK4</b> is  | <b>ON</b>    |
| <input type="checkbox"/> | <b>VERIFY</b>  | At encl 4521 <b>AGS Inlks OK</b> Redundant relay <b>HK5</b> is   | <b>ON</b>    |
|                          | <b>ENABLE</b>  | <b>Extraction</b> with <b>693</b> key at panel <b>H</b> in MCR   |              |
| <input type="checkbox"/> | <b>VERIFY</b>  | At panel <b>H</b> in MCR <b>DH2, 3 ready light</b> is  | <b>ON</b>    |
| <input type="checkbox"/> | <b>VERIFY</b>  | At panel <b>H</b> in MCR <b>F6 ready light</b> is  | <b>ON</b>    |
|                          | <b>PRESS</b>   | <b>Extraction Disable</b> Switch at panel <b>H</b> in MCR  |              |
| <input type="checkbox"/> | <b>VERIFY</b>  | At panel <b>H</b> in MCR <b>DH2, 3 ready light</b> is  | <b>OFF</b>   |
| <input type="checkbox"/> | <b>VERIFY</b>  | At panel <b>H</b> in MCR <b>F6 ready light</b> is  | <b>OFF</b>   |
| <input type="checkbox"/> | <b>TURN OFF<br/>VERIFY</b>   | At encl 4521 relays: <b>HK4</b> and <b>HK5</b><br>At encl 4521 relays: <b>HK4</b> <input type="checkbox"/> and <b>HK5</b> <input type="checkbox"/> are | <b>OFF</b>   |
| <input type="checkbox"/> | <b>Check for acceptance of Setup and test of Booster Critical Device DH2, 3 Power Supply under power</b> |  |              |

#### 1.6 Setup and test of Booster Main Magnet Power Supply under power

- |                          |   |  |                 |
|--------------------------|---|--|-----------------|
| <input type="checkbox"/> | <b>VERIFY</b>   | <b>Main Magnet</b> Power Supply is   | <b>NO LOTO</b>  |
| <input type="checkbox"/> | <b>PLACE<br/>VERIFY</b>   | <b>Bstr</b> in Controlled access ( <b>CA</b> )<br>MCR sees at Opto Monitor <b>Bstr</b> in                  | <b>CA</b>       |
| <input type="checkbox"/> | <b>VERIFY</b>   | At encl 4521 relay <b>JK14</b> , Bstr Ring Magnet PSs Intlk Ok, is   | <b>ON</b>       |
| <input type="checkbox"/> | <b>HAVE<br/>VERIFY</b>  | MCR Operator <b>turn on</b> Booster Main Magnet Power supply<br><b>Booster Main Magnet</b> Power Supply is | <b>ON</b>       |
|                          | <b>TURN OFF</b>   | At encl 4521 <b>relay JK14</b>   |                 |
| <input type="checkbox"/> | <b>VERIFY</b>   | Booster Main Magnet Power Supply is  | <b>OFF</b>      |
| <input type="checkbox"/> | <b>VERIFY</b>   | MCR sees at Opto Monitor <b>Bstr Ring Magnet PSs</b>   | <b>INTKLED</b>  |
|                          | <b>TURN ON</b>  | At encl 4521 <b>relay JK14</b>   |                 |
| <input type="checkbox"/> | <b>VERIFY</b>   | MCR sees at Opto Monitor <b>Bstr Ring Magnet PSs</b>   | <b>INTLK OK</b> |
| <input type="checkbox"/> | <b>Check for acceptance of Setup and test of Booster Main Magnet Power Supply under power</b> |  |                 |



**1.7 Setup and test of Booster Vertical and Horizontal Quads Power Supplies under power**

- |                          |   |  |                 |
|--------------------------|---|--|-----------------|
| <input type="checkbox"/> | <b>VERIFY</b>   | <b>Bstr Vert and Horz Quads</b> Power Supplies are                       | <b>NO LOTO</b>  |
|                          | <b>PLACE</b>  | <b>Bstr</b> in Controlled access (CA)                                    |                 |
| <input type="checkbox"/> | <b>VERIFY</b>   | <b>MCR</b> sees at Opto Monitor <b>Bstr</b> in                           | <b>CA</b>       |
| <input type="checkbox"/> | <b>VERIFY</b>   | At encl 4521 relay <b>JK14</b> , Bstr Ring Magnet PSs Intlk Ok, is       | <b>ON</b>       |
|                          | <b>HAVE</b>   | MCR Operator <b>turn on Booster Vert &amp; Horz Quads</b> Power supplies | <b>ON</b>       |
|                          | <b>TURN OFF</b>   | At encl 4521 <b>relay JK14</b>   |                 |
| <input type="checkbox"/> | <b>VERIFY</b>   | Booster Main Magnet Power Supply is                                      | <b>OFF</b>      |
| <input type="checkbox"/> | <b>VERIFY</b>   | <b>MCR</b> sees at Opto Monitor <b>Bstr Ring Magnet PSs</b>              | <b>INTKLED</b>  |
|                          | <b>TURN ON</b>  | At encl 4521 <b>relay JK14</b>   |                 |
| <input type="checkbox"/> | <b>VERIFY</b>   | <b>MCR</b> sees at Opto Monitor <b>Bstr Ring Magnet PSs</b>              | <b>INTLK OK</b> |
| <input type="checkbox"/> | <b>Check for acceptance of Setup and test of Booster Main Magnet Power Supply under power</b> |  |                 |

**1.8 Setup and test of Booster Low Field Quad Trims 1, 2, 3 and 4 Power Supplies under power**

- |                          |  |   |                 |
|--------------------------|--|---|-----------------|
| <input type="checkbox"/> | <b>VERIFY</b>  | <b>Low Field Quad Trims 1, 2, 3 and 4 Power Supplies</b> are                          | <b>NO LOTO</b>  |
|                          | <b>PLACE</b>   | <b>Bstr</b> in Controlled access (CA)   |                 |
| <input type="checkbox"/> | <b>VERIFY</b>  | <b>MCR</b> sees at Opto Monitor <b>Bstr</b> in  | <b>CA</b>       |
| <input type="checkbox"/> | <b>VERIFY</b>  | At encl 4521 relay <b>JK14</b> , Bstr Main Magnet PSs Intlk Ok, is                    | <b>ON</b>       |
|                          | <b>HAVE</b>  | MCR Operator <b>turn on</b> Booster Low Field Quad Trims 1, 2, 3 and 4 Power Supplies |                 |
| <input type="checkbox"/> | <b>VERIFY</b>  | <b>Booster Low Field Quad Trims 1, 2, 3 and 4 Power Supplies</b> are                  | <b>ON</b>       |
|                          | <b>TURN OFF</b>  | At encl 4521 <b>relay JK14</b>  |                 |
| <input type="checkbox"/> | <b>VERIFY</b>  | Booster <b>Low Field Quad Trims 1, 2, 3 and 4 Power Supplies</b> are                  | <b>OFF</b>      |
| <input type="checkbox"/> | <b>VERIFY</b>  | <b>MCR</b> sees at Opto Monitor <b>Bstr Ring Magnet PSs</b>                           | <b>INTKLED</b>  |
|                          | <b>TURN ON</b>   | At encl 4521 <b>relay JK14</b>  |                 |
| <input type="checkbox"/> | <b>VERIFY</b>  | <b>MCR</b> sees at Opto Monitor <b>Bstr Ring Magnet PSs</b>                           | <b>INTLK OK</b> |
| <input type="checkbox"/> | <b>Check for acceptance of Setup and test of Booster Low Field Quad Trims 1, 2, 3 and 4 Power Supplies under power</b> |   |                 |

**1.9 Setup and test of Reachback to LTB Bs 1 & 2 to U/S Lock-out switch with DH 2, 3 & F6 to Ready Light and the Feed Forward (FF) switch in the ON position**

<input type="checkbox"/>	<b>PLACE</b>	<b>Feed Forward (FF) switch in</b>	<b>ON Position</b>
<input type="checkbox"/>	<b>VERIFY</b>	<b>FF switch is in</b>	<b>ON Position</b>
<input type="checkbox"/>	<b>VERIFY</b>	At panel <b>H</b> in MCR <b>DH2, 3 ready light</b> is	<b>OFF</b>
<input type="checkbox"/>	<b>VERIFY</b>	At panel <b>H</b> in MCR <b>F6 ready light</b> is	<b>OFF</b>
<input type="checkbox"/>	<b>PLACE</b>	<b>Bstr</b> in Controlled access (CA)	
<input type="checkbox"/>	<b>VERIFY</b>	<b>MCR</b> sees at Opto Monitor <b>Bstr</b> in	<b>CA</b>
<input type="checkbox"/>	<b>CAPTURE</b>	<b>Booster Key Lock-Out</b> on MCR panel <b>H</b>	
<input type="checkbox"/>	<b>VERIFY</b>	<b>MCR</b> sees at Opto Monitor <b>Booster key Lock-Out</b> is	<b>CAPTURED</b>
<input type="checkbox"/>	<b>TURN ON</b>	At encl 4521 <b>AGS Inlks OK</b> relays <b>HK4</b> and <b>HK5</b>	
<input type="checkbox"/>	<b>VERIFY</b>	At encl 4521 <b>AGS Inlks OK</b> relays <b>HK4</b> <input type="checkbox"/> and <b>HK5</b> <input type="checkbox"/> are	<b>ON</b>
	<b>ENABLE</b>	<b>Extraction</b> with <b>693</b> key at panel <b>H</b> in MCR	
<input type="checkbox"/>	<b>VERIFY</b>	At panel <b>H</b> in MCR <b>DH2, 3 ready light</b> is	<b>ON</b>
<input type="checkbox"/>	<b>VERIFY</b>	At panel <b>H</b> in MCR <b>F6 ready light</b> is	<b>ON</b>
<input type="checkbox"/>	<b>OPEN</b>	At encl 4521 <b>Ltb 1</b> and <b>Ltb 2</b> to LTB U/S Lock-out switch	
<input type="checkbox"/>	<b>VERIFY</b>	At encl 4521 LTB Lock-out switch has	<b>POWER</b>
	<b>TURN OFF</b>	At encl 4521 relay <b>HK7</b> , Current Xfmr	
<input type="checkbox"/>	<b>VERIFY</b>	At encl 4521 relays: <b>HK4</b> <input type="checkbox"/> and <b>HK5</b> <input type="checkbox"/> are	<b>ON</b>
<input type="checkbox"/>	<b>VERIFY</b>	At panel <b>H</b> in MCR <b>DH2, 3 ready light</b> is	<b>ON</b>
<input type="checkbox"/>	<b>VERIFY</b>	At panel <b>H</b> in MCR <b>F6 ready light</b> is	<b>ON</b>
<input type="checkbox"/>	<b>VERIFY</b>	At encl 4521 LTB U/S Lock-out switch has	<b>NO POWER</b>
<input type="checkbox"/>	<b>TURN OFF</b>	At encl 4521 <b>AGS Inlks OK</b> relays <b>HK4</b> and <b>HK5</b>	
<input type="checkbox"/>	<b>VERIFY</b>	At encl 4521 <b>AGS Inlks OK</b> relays <b>HK4</b> <input type="checkbox"/> and <b>HK5</b> <input type="checkbox"/> are	<b>OFF</b>
<input type="checkbox"/>	<b>VERIFY</b>	At panel <b>H</b> in MCR <b>DH2, 3 ready light</b> is	<b>OFF</b>
<input type="checkbox"/>	<b>VERIFY</b>	At panel <b>H</b> in MCR <b>F6 ready light</b> is	<b>OFF</b>
<input type="checkbox"/>	<b>Check for acceptance of Setup and test of Reachback to LTB Bs 1 &amp; 2 to U/S Lock-out switch with DH 2, 3 &amp; F6 to Ready Light and the Feed Forward (FF) switch in the ON position</b>		

**1.10 Setup and test of Reachback to TTB Bs 1 & 2 to U/S Lock-out switch with DH 2, 3 & F6 to Ready Light and the Feed Forward (FF) switch in the ON position**

<input type="checkbox"/>	<b>PLACE</b>	<b>Feed Forward (FF) switch in</b>	<b>ON Position</b>
<input type="checkbox"/>	<b>VERIFY</b>	<b>FF switch is in</b>	<b>ON Position</b>
<input type="checkbox"/>	<b>VERIFY</b>	At panel <b>H</b> in MCR <b>DH2, 3 ready light</b> is	<b>OFF</b>
<input type="checkbox"/>	<b>VERIFY</b>	At panel <b>H</b> in MCR <b>F6 ready light</b> is	<b>OFF</b>
<input type="checkbox"/>	<b>PLACE</b>	<b>Bstr</b> in Controlled access (CA)	
<input type="checkbox"/>	<b>VERIFY</b>	<b>MCR</b> sees at Opto Monitor <b>Bstr</b> in	<b>CA</b>
<input type="checkbox"/>	<b>CAPTURE</b>	<b>Booster Key Lock-Out</b> on MCR panel <b>H</b>	
<input type="checkbox"/>	<b>VERIFY</b>	<b>MCR</b> sees at Opto Monitor <b>Booster key Lock-Out</b> is	<b>CAPTURED</b>
<input type="checkbox"/>	<b>TURN ON</b>	At encl 4521 <b>AGS Inlks OK</b> relays <b>HK4</b> and <b>HK5</b>	
<input type="checkbox"/>	<b>VERIFY</b>	At encl 4521 <b>AGS Inlks OK</b> relays <b>HK4</b> <input type="checkbox"/> and <b>HK5</b> <input type="checkbox"/> are	<b>ON</b>
	<b>ENABLE</b>	<b>Extraction</b> with <b>693</b> key at panel <b>H</b> in MCR	
<input type="checkbox"/>	<b>VERIFY</b>	At panel <b>H</b> in MCR <b>DH2, 3 ready light</b> is	<b>ON</b>
<input type="checkbox"/>	<b>VERIFY</b>	At panel <b>H</b> in MCR <b>F6 ready light</b> is	<b>ON</b>
<input type="checkbox"/>	<b>OPEN</b>	At encl 4521 <b>Ttb 1</b> and <b>Ttb 2</b> to TTB U/S Lock-out switch	
<input type="checkbox"/>	<b>VERIFY</b>	At encl 4521 TTB Lock-out switch has	<b>POWER</b>
	<b>TURN OFF</b>	At encl 4521 <b>relay FK8, HEBT Xover swept</b>	
<input type="checkbox"/>	<b>VERIFY</b>	At encl 4521 realys: <b>HK4</b> <input type="checkbox"/> and <b>HK5</b> <input type="checkbox"/> are	<b>ON</b>
<input type="checkbox"/>	<b>VERIFY</b>	At panel <b>H</b> in MCR <b>DH2, 3 ready light</b> is	<b>ON</b>
<input type="checkbox"/>	<b>VERIFY</b>	At panel <b>H</b> in MCR <b>F6 ready light</b> is	<b>ON</b>
<input type="checkbox"/>	<b>VERIFY</b>	At encl 4521 TTB U/S Lock-out switch has	<b>NO POWER</b>
<input type="checkbox"/>	<b>TURN OFF</b>	At encl 4521 <b>AGS Inlks OK</b> relays <b>HK4</b> and <b>HK5</b>	
<input type="checkbox"/>	<b>VERIFY</b>	At encl 4521 <b>AGS Inlks OK</b> relays <b>HK4</b> <input type="checkbox"/> and <b>HK5</b> <input type="checkbox"/> are	<b>OFF</b>
<input type="checkbox"/>	<b>VERIFY</b>	At panel <b>H</b> in MCR <b>DH2, 3 ready light</b> is	<b>OFF</b>
<input type="checkbox"/>	<b>VERIFY</b>	At panel <b>H</b> in MCR <b>F6 ready light</b> is	<b>OFF</b>
<input type="checkbox"/>	<b>Check for acceptance of Setup and test of Reachback to TTB Bs 1 &amp; 2 to U/S Lock-out switch with DH 2, 3 &amp; F6 to Ready Light and the Feed Forward (FF) switch in the ON position</b>		

**1.11 Setup and test of Reachback to LEBT Bs 1 & 2 (Leb 1 & Leb 2) with failure of LTB Bs 1 & 2 (Ltb 1 & Ltb 2)**

- |                          |  |  |                |
|--------------------------|--|--|----------------|
|                          | <b>CLOSE</b>   | Water-flow switch (WFS) to Ltb 1                                       |                |
| <input type="checkbox"/> | <b>VERIFY</b>  | At encl 4521 relay <b>FK14</b> is                                      | <b>OFF</b>     |
| <input type="checkbox"/> | <b>VERIFY</b>  | <b>MCR</b> sees at Opto Monitor <b>Bstr LTB B/S (Leb 1&amp;2 Rhbk)</b> | <b>FAILURE</b> |
|                          | <b>OPEN</b>  | Water-flow switch (WFS) to Ltb 1                                       |                |
|                          | <b>CLEAR</b>   | Rhbk at panel D in MCR with H693 key and P/B                           |                |
| <input type="checkbox"/> | <b>VERIFY</b>  | <b>MCR</b> sees at Opto Monitor <b>Bstr LTB B/S</b>                    | <b>OK</b>      |
|                          |  |  |                |
|                          | <b>CLOSE</b>   | Water-flow switch (WFS) to Ltb 2                                       |                |
| <input type="checkbox"/> | <b>VERIFY</b>  | At encl 4521 relay <b>JK1</b> is                                       | <b>OFF</b>     |
| <input type="checkbox"/> | <b>VERIFY</b>  | <b>MCR</b> sees at Opto Monitor <b>Bstr LTB B/S (Leb 1&amp;2 Rhbk)</b> | <b>FAILURE</b> |
|                          | <b>OPEN</b>  | Water-flow switch (WFS) to Ltb 2                                       |                |
|                          | <b>CLEAR</b>   | Rhbk at panel D in MCR with H693 key and P/B                           |                |
| <input type="checkbox"/> | <b>VERIFY</b>  | <b>MCR</b> sees at Opto Monitor <b>Bstr LTB B/S</b>                    | <b>OK</b>      |
|                          |  |  |                |
| <input type="checkbox"/> | <b>Check for acceptance of Setup and test of Reachback to LEBT Bs 1 &amp; 2 with failure of LTB Bs 1 &amp; 2</b> |  |                |

**1.12 Setup and test of Reachback to 26DH2 Power Supply with failure of TTB Bs 1 & 2 (Ttb 1 & Ttb 2)**

- |                          |   |  |                   |
|--------------------------|---|--|-------------------|
|                          | <b>TURN ON</b>  | At encl 4521 relays: <b>IK2</b> and <b>IK4</b>   |                   |
| <input type="checkbox"/> | <b>VERIFY</b>   | <b>MCR</b> sees at Opto Monitor <b>TTB Bs 1 <input type="checkbox"/> and Bs 2 <input type="checkbox"/></b> | <b>OPEN</b>       |
|                          | <b>TURN OFF</b>   | At encl 4521 <b>IK2</b>  |                   |
|                          |   |  |                   |
| <input type="checkbox"/> | <b>VERIFY</b>   | <b>MCR</b> sees at Opto Monitor <b>TTB Bs 1</b>  | <b>CLOSED</b>     |
| <input type="checkbox"/> | <b>VERIFY</b>   | <b>MCR</b> sees at Opto Monitor <b>TTB Bs failure &amp; Rhbk to 26DH2</b>                                  | <b>INTLK</b>      |
| <input type="checkbox"/> | <b>VERIFY</b>   | <b>MCR</b> sees at <b>panel D</b> TTB BS failure Rhbk 26DH2 light  | <b>ON</b>         |
| <input type="checkbox"/> | <b>VERIFY</b>   | Attempt to <b>reset</b> rhbk with <b>H 693 key and P/B</b> on panel D                                      | <b>FAIL</b>       |
|                          |   |  |                   |
|                          | <b>TURN OFF</b>   | At encl 4521 <b>IK2</b> and <b>IK4</b>   |                   |
| <input type="checkbox"/> | <b>VERIFY</b>   | <b>MCR</b> sees at Opto Monitor <b>TTB Bs 1 and Bs 2</b>   | <b>CLOSED</b>     |
| <input type="checkbox"/> | <b>VERIFY</b>   | Attempt to <b>reset</b> rhbk with <b>H 693 key and P/B</b> on panel D                                      | <b>SUCCESSFUL</b> |
|                          |   |  |                   |
| <input type="checkbox"/> | <b>Check for acceptance of Setup and test of Reachback to 26DH2 Power Supply with failure of TTB Bs 1 &amp; 2 (Ttb 1 &amp; Ttb 2)</b> |  |                   |

**1.13 Setup and test of HEBT –TTB Crossover**

- |                          |               |  |              |
|--------------------------|---------------|--|--------------|
|                          | <b>RESET</b>  | <b>AGS / HEBT</b> gate from <b>Linac side</b> at encl M14A24A2 with <b>705 key</b> |              |
| <input type="checkbox"/> | <b>VERIFY</b> | At encl M14A24A2 <b>Reset</b> light is   | <b>ON</b>    |
| <input type="checkbox"/> | <b>VERIFY</b> | <b>MCR</b> sees at <b>W-Panel AGS / HEBT Not Reset</b> light is                    | <b>OFF</b>   |
| <input type="checkbox"/> | <b>VERIFY</b> | <b>MCR</b> sees at Opto monitor <b>AGS / HEBT</b> gate is                          | <b>RESET</b> |
|                          |               |  |              |
|                          | <b>RESET</b>  | <b>N322</b> gate from <b>Linac side</b> at encl 5032 with <b>705 key</b>           |              |
| <input type="checkbox"/> | <b>VERIFY</b> | At encl 5032 <b>Reset</b> light is   | <b>ON</b>    |
| <input type="checkbox"/> | <b>VERIFY</b> | <b>MCR</b> sees at <b>W-Panel N322</b> gate <b>Not Reset</b> light is              | <b>OFF</b>   |
| <input type="checkbox"/> | <b>VERIFY</b> | <b>MCR</b> sees at Opto monitor <b>N322</b> gate is                                | <b>RESET</b> |

- |                          |  |   |                  |
|--------------------------|--|---|------------------|
|                          | <b>RESET</b>   | <b>LINAC / HEBT gate from Linac side at encl 5114 with 705 key</b>  |                  |
| <input type="checkbox"/> | <b>VERIFY</b>  | At encl 5114 <b>Reset</b> light is                                  | <b>ON</b>        |
| <input type="checkbox"/> | <b>VERIFY</b>  | <b>MCR sees at Opto monitor Linac U/S HEBT for TTB operation is</b> | <b>RESET</b>     |
|                          | <b>OPEN</b>  | <b>LINAC / HEBT gate with Simultaneous release from MCR</b>         |                  |
| <input type="checkbox"/> | <b>VERIFY</b>  | At encl 5114 <b>Reset</b> light is                                  | <b>OFF</b>       |
| <input type="checkbox"/> | <b>VERIFY</b>  | <b>MCR sees at Opto monitor Linac U/S HEBT for TTB operation is</b> | <b>NOT RESET</b> |
| <input type="checkbox"/> | <b>Check for acceptance of Setup and test of HEBT –TTB Crossover</b> |   |                  |

**1.14 Test of Booster B6 Shutter Opens before TTB and LTB Beam stops can be opened with NSRL in Mode 17**

- |                          |   |   |                    |
|--------------------------|---|---|--------------------|
|                          | <b>PLACE</b>  | <b>Bstr in Controlled Access (CA)</b>   |                    |
| <input type="checkbox"/> | <b>VERIFY</b>   | <b>MCR sees at Opto Monitor Bstr in</b>   | <b>CA</b>          |
|                          | <b>CLOSE</b>  | <b>At encl 4521 bldg 914 LTB Lock-Out switch</b>  |                    |
| <input type="checkbox"/> | <b>VERIFY</b>   | <b>MCR sees at Opto Monitor LTB Lock-Out switch</b>   | <b>CLOSED</b>      |
|                          | <b>SET</b>  | <b>Critical Device Switch (CDS) for</b>   | <b>NSRL</b>        |
| <input type="checkbox"/> | <b>VERIFY</b>   | <b>CDS is set for</b>   | <b>NSRL</b>        |
|                          | <b>PLACE</b>  | <b>PEER 27 in Controlled Access (CA), Mode 16</b>   |                    |
| <input type="checkbox"/> | <b>VERIFY</b>   | <b>PEER 27 is in CA</b>   | <b>MODE 16</b>     |
|                          | <b>FORCE</b>  | <b>Sweep of Zone NSRL-Z3</b>  |                    |
| <input type="checkbox"/> | <b>VERIFY</b>   | <b>MCR sees Zone NSRL-Z3</b>  | <b>SWEPT</b>       |
|                          | <b>RESET</b>  | <b>Gates BGI2</b>   |                    |
| <input type="checkbox"/> | <b>VERIFY</b>   | <b>MCR sees Gates BGI2</b>  | <b>RESET</b>       |
|                          | <b>PLACE</b>  | <b>PEER 27 in Controlled Access (XA), Mode 17</b>   |                    |
| <input type="checkbox"/> | <b>VERIFY</b>   | <b>PEER 27 is in XA</b>   | <b>MODE 17</b>     |
|                          | <b>After</b>  | <b>30 secs</b>  |                    |
| <input type="checkbox"/> | <b>VERIFY</b>   | <b>MCR sees: Z1PCD=Z2PCD: D6AC <input type="checkbox"/> D6DC <input type="checkbox"/> NSRL B/P <input type="checkbox"/></b>   | <b>DISABLED</b>    |
| <input type="checkbox"/> | <b>VERIFY</b>   | <b>MCR sees: Z3PCD=Z1RBCD=Z2RBCD: TTB <input type="checkbox"/> LTB <input type="checkbox"/> BSB6 <input type="checkbox"/></b> | <b>ENABLED</b>     |
| <input type="checkbox"/> | <b>VERIFY</b>   | <b>BSB6 is</b>  | <b>ENABLED OUT</b> |
| <input type="checkbox"/> | <b>VERIFY</b>   | <b>TTB <input type="checkbox"/> LTB <input type="checkbox"/> are</b>  | <b>ENABLED IN</b>  |
| <input type="checkbox"/> | <b>Check for acceptance Test of Booster B6 Shutter Opens before TTB and LTB Beam stops can be opened with NSRL in Mode 17</b> |   |                    |

- 1.15 Test of Booster B6 cooling water flow-switch interlock**
- |                          |                 |   |               |
|--------------------------|-----------------|---|---------------|
|                          | <b>TURN OFF</b> | Cooling water to <b>B6</b> in Bstr ring             |               |
| <input type="checkbox"/> | <b>VERIFY</b>   | MCR sees at Opto monitor <b>B6 cooling water</b> is | <b>INTLKD</b> |
|                          | <b>TURN ON</b>  | Cooling water to <b>B6</b> in Bstr ring             |               |
| <input type="checkbox"/> | <b>VERIFY</b>   | MCR sees at Opto monitor <b>B6 cooling water</b> is | <b>OK</b>     |
- ☐ **Check for acceptance Test of Booster B6 cooling water-flow switch interlock**
- 
- 1.16 Test of Booster D3 Septum cooling water-flow switch interlock**
- |                          |                 |   |               |
|--------------------------|-----------------|---|---------------|
|                          | <b>TURN OFF</b> | Cooling water to <b>D3</b> in Bstr ring             |               |
| <input type="checkbox"/> | <b>VERIFY</b>   | MCR sees at Opto monitor <b>D3 cooling water</b> is | <b>INTLKD</b> |
|                          | <b>TURN ON</b>  | Cooling water to <b>D3</b> in Bstr ring             |               |
| <input type="checkbox"/> | <b>VERIFY</b>   | MCR sees at Opto monitor <b>D3 cooling water</b> is | <b>OK</b>     |
- ☐ **Check for acceptance Test of Booster D3 Septum cooling water-flow switch interlock**
- 
- 1.17 Test of LTB Beam Stop 1(Ltb 1) cooling water flow-switch interlock**
- |                          |                 |   |                   |
|--------------------------|-----------------|---|-------------------|
|                          | <b>TURN OFF</b> | Cooling water to <b>Ltb 1</b> in Bstr ring                            |                   |
| <input type="checkbox"/> | <b>VERIFY</b>   | MCR sees at Opto monitor <b>Ltb 1 cooling water</b> is                | <b>INTLKD</b>     |
| <input type="checkbox"/> | <b>VERIFY</b>   | Attempt to clear <b>Intlk</b> at Panel D with <b>H693 key and P/B</b> | <b>FAIL</b>       |
|                          | <b>TURN ON</b>  | Cooling water to <b>Ltb 1</b> in Bstr ring                            |                   |
| <input type="checkbox"/> | <b>VERIFY</b>   | Attempt to clear <b>Intlk</b> at Panel D with <b>H693 key and P/B</b> | <b>SUCCESSFUL</b> |
| <input type="checkbox"/> | <b>VERIFY</b>   | MCR sees at Opto monitor <b>Ltb 1 cooling water</b> is                | <b>OK</b>         |
- ☐ **Check for acceptance Test of LTB Beam Stop 1(Ltb 1) cooling water-flow switch interlock**
- 
- 1.18 Test of LTB Beam Stop 2 (Ltb 2) cooling water flow-switch interlock**
- |                          |                 |   |                   |
|--------------------------|-----------------|---|-------------------|
|                          | <b>TURN OFF</b> | Cooling water to <b>Ltb 2</b> in Bstr ring                            |                   |
| <input type="checkbox"/> | <b>VERIFY</b>   | MCR sees at Opto monitor <b>Ltb 2 cooling water</b> is                | <b>INTLKD</b>     |
| <input type="checkbox"/> | <b>VERIFY</b>   | Attempt to clear <b>Intlk</b> at Panel D with <b>H693 key and P/B</b> | <b>FAIL</b>       |
|                          | <b>TURN ON</b>  | Cooling water to <b>Ltb 2</b> in Bstr ring                            |                   |
| <input type="checkbox"/> | <b>VERIFY</b>   | Attempt to clear <b>Intlk</b> at Panel D with <b>H693 key and P/B</b> | <b>SUCCESSFUL</b> |
| <input type="checkbox"/> | <b>VERIFY</b>   | MCR sees at Opto monitor <b>Ltb 2 cooling water</b> is                | <b>OK</b>         |
- ☐ **Check for acceptance Test of LTB Beam Stop 2 (Ltb 2) cooling water flow-switch interlock**

**1.19 Acknowledgment that Additional Tests in C-A-OPM-ATT 4.120.69. 1 are required**

**C-A-OPM-ATT 4.120.69.1**

- 1.1 Setup and test of Booster Critical Devices: LTB Beam-Stop1(Ltb 1) and LTB Beam-Stop 2 (Ltb 2)**
- 1.2 Setup and test of Booster Critical Devices: TTB Beam-Stop1(Ttb 1) and TTB Beam-Stop 2 (Ttb 2)**
- 1.3 Setup and test of Booster Critical Device DH2, 3 Power Supply under power**
- 1.4 Setup and test of Booster Critical Device F6 Power Supply under power**
- 1.5 Setup and test of Booster Main Magnet Power Supply under power**
- 1.6 Setup and test of Booster Vertical and Horizontal Quads Power Supplies under power**
- 1.7 Setup and test of Booster Low Field Quad Trims 1, 2, 3 and 4 Power Supplies under power**
- 1.8 Setup and test of Reachback to LTB Bs 1 & 2 to U/S Lock-out switch with DH 2, 3 & F6 to Ready Light and the Feed Forward (FF) switch in the ON position**
- 1.9 Setup and test of Reachback to TTB Bs 1 & 2 to U/S Lock-out switch with DH 2, 3 & F6 to Ready Light and the Feed Forward (FF) switch in the ON position**
- 1.10 Setup and test of Reachback to LEBT Bs 1 & 2 (Leb 1 & Leb 2) with failure of LTB Bs 1 & 2 (Ltb 1 & Ltb 2)**
- 1.11 Setup and test of Reachback to 26DH2 Power Supply with failure of TTB Bs 1 & 2 (Ttb 1 & Ttb 2)**
- 1.12 Setup and test of HEBT –TTB Crossover**
- 1.13 Test of Booster B6 Shutter Opens before TTB and LTB Beam stops can be opened with NSRL in Mode 17**
- 1.14 Test of Booster B6 cooling water flow-switch interlock**
- 1.15 Test of Booster D3 Septum cooling water-flow switch interlock**
- 1.16 Test of LTB Beam Stop 1(Ltb 1) cooling water flow-switch interlock**
- 1.17 Test of LTB Beam Stop 2 (Ltb 2) cooling water flow-switch interlock**
- ☐ **Check for acceptance of Acknowledgement that Additional Tests in C-A-OPM-ATT 4.120.69.1 are required**

**END OF TEST PROCEDURE**

**TTL: Sign for completion of initial testing:** \_\_\_\_\_

**Date:** \_\_\_\_/\_\_\_\_/\_\_\_\_

**TTL: Sign for completion of final testing:** \_\_\_\_\_

**Date:** \_\_\_\_/\_\_\_\_/\_\_\_\_